SORELL
SOIL REPORT

Reconnaissance Soil Map Series of Tasmania

A Revised Edition
by Stacey Spanswick
Department of Primary Industries, Water and Environment
Tasmania
1999

of Divisional Report 10/55 Sorell
By J. Loveday
C.S.I.R.O Division of Soils, Adelaide, 1955

Sorell Report
and accompanying 1:100 000 Sorell
Soil Reconnaissance map

DEPARTMENT *of* PRIMARY INDUSTRIES, WATER *and* ENVIRONMENT
Tasmania

Natural Heritage Trust
Helping Communities Helping Australia

ACKNOWLEDGEMENTS

This report and accompanying map are revised versions of original work by CSIRO (Loveday, 1955c). We gratefully acknowledge the original work of Loveday and the CSIRO Division of Soils, Adelaide for supporting this project.

We would like to acknowledge the contribution of the following groups and individuals who have assisted with the reprinting and updating of this report and accompanying map.

We would like to especially thank Dr John Loveday for editing the draft map sheet and report.

The DPIWE staff who contributed to this project. Darren Kidd and Paul Pohlner for assisting with field work, Mark Brown and Tony Davidson for their SIS support, Linda Green for retyping the reports and Jim Talbot for providing Oracle technical assistance.

The members of the Steering Committee, Maureen Bennet, Kathy Noble, Chris Grose and Bill Cotching for their advice and support.

The Natural Heritage Trust for jointly funding this project.

PREFACE

The Reconnaissance Series

Over a 27 year period (1940 - 1967), the CSIRO Division of Soils, Adelaide undertook a series of reconnaissance (small scale) soil surveys and some more detailed (large scale) soil surveys of the agricultural land in Tasmania. However, most of these reports are out of print and of limited availability, the terminology is dated and inconsistencies in map units exist across map sheets. In 1997, the Department of Primary Industries, Water and Environment (DPIWE) and the Natural Heritage Trust, put together a project to correlate and reprint the maps and reports and to extend this information and its value as a tool for sustainable land management, to a variety of potential users.

This report is part of the “Reconnaissance Soil Map of Tasmania” series which were published at a scale of 1 inch to 1 mile (1:63 360). The reconnaissance series has been expanded to include the soil maps that were not part of the original “Reconnaissance Soil Map of Tasmania” series but mapped at scales of 1 inch to 1 mile and 1 inch to 2 miles (1:126 000). These maps have been reformatted and reprinted by the DPIWE at a scale of 1:100 000 to be consistent with more recent soil mapping scales (eg South Esk 1:100 000 soil map (southern half), Doyle, 1993), the land capability mapping series and the current Tasmanian Land Tenure map series.

It is not the aim of this project to remap the areas covered by the Reconnaissance series or to change the intensity of mapping, but to correlate, standardise and enhance existing information and provide the public and DPIWE staff with more consistent, reliable and accessible soil resource information.

Correlation of the Sorell Reconnaissance Soil Map

Defining Map units

In attempting to correlate soils across the reconnaissance soil maps around the State differences in the nature of the map units have caused some problems. Map units on the initial maps investigated (Longford, Quamby and South Esk), essentially depicted broad scale “soil associations”. These associations identified and described a dominant soil and a range of minor soils which were generally associated with recognisable landscape features. For example the Eastfield Association, dominated by the Eastfield Soil Profile Class (SPC), has a range of minor soils such as the Panshanger SPC and the Bloomfield SPC which are found on rolling to steep dolerite hills.

In other parts of the State, including the Sorell sheet, the map units of the Reconnaissance Soil Maps have been generally defined on the basis of Great Soil Groups (Stace *et al*., 1968) and parent material, eg Podzolic Soils on Dolerite. In many instances a dominant or representative soil has been identified and where adequate existing data is available it is possible to define an SPC for that soil. In such cases it is sometimes possible to correlate with SPC’s defined elsewhere. However because of insufficient data for the minor soils it is not possible to define and correlate the minor soils around the state. Therefore there is a unit “Podzolics on Dolerite” and another “Eastfield Association” both of which are dominated by the Eastfield

SPC but which may have different minor soils. To correlate these two units based on the dominant soil only, would be incorrect and misleading. Instead the original map unit name has been retained. Where a dominant soil has been identified, the map unit has been assigned a number eg Podzolics on Dolerite 1 (Pd1), with the identified dominant soil outlined in the report and on the legend of the map.

In some instances sufficient data exists to determine that a particular polygon or group of polygons i.e areas which are enclosed by specific boundaries, have a different dominant soil to others of a similar map unit name. However the data is insufficient to allow the precise definition of that soil. These map units have been assigned a numerical value. (e.g Pm1 & Pm2). The distinction between these polygons and polygons where a dominant soil has been defined (eg Pd1), is apparent by the absence of a defined dominant soil in the report and on the legend of the map.

Due to resource constraints only a limited amount of time could be spent investigating these less well defined soils and map units. Hence the term "insufficient data" occurs widely throughout the legend. The correlation of the Reconnaissance Soil Maps has highlighted how little information is available for some of Tasmania's major soils.

The Sorell Map

The Sorell Reconnaissance Soil Map adjoins the Buckland map (Spanswick *et al.*, 2000b) on its northern boundary, the Hobart map (Spanswick *et al.*, 2000d) on its western boundary and the Brighton (Spanswick *et al.*, 2000c) on its north west corner. For an index map of the 1:100 000 Reconnaissance Soil Surveys of Tasmania, see Appendix 7.

Soil Taxonomic Units

A soil taxonomic unit is a general term for a grouping of soils based on similarities of the soils within the group, and differences compared with other groups. Map units consist of defined areas of contiguous soil taxonomic units. As outlined previously the soil taxonomic units used by Loveday in this survey are Great Soil Group (Stace *et al.*, 1968). This has been replaced where possible by Soil Profile Class (SPC) as this will standardise taxonomic units across the Sorell map and be consistent with taxonomic units used within the more recent South Esk soil map and by other states. A SPC is a group or class of soil profiles within a map unit which have similar morphological characteristics, and may have similar chemical properties (Gunn *et al*., 1988). The SPCs were constructed through the use of existing reports, historical soil data in the DPIWE soil database and additional field work. A key to soil horizon designations used within the SPCs is provided in Appendix 1. The lines separating horizons within the SPC reports are shown by broken and solid lines. The broken lines show a diffuse or gradual change to the next horizon whereas the solid lines show a clear or abrupt transition. If the horizon transition is unknown a larger broken line is used. The SPCs generally include land capability classifications, for a description of these classes refer to K.E. Noble (1992). Where we could not produce an SPC for a map unit, due to a lack of information, type profiles of a dominant soil, where identified by Loveday on the original map, have been added to the report, wherever possible.

Map Edits

Loveday mapped some of the polygons in the eastern half of the sheet as more than one type of map unit. For example a single map unit may be labelled both “Pd” and “Pd with Bd”. This is really a complex unit. However because the occurrence of Pd with Bd is in only a part of the polygon, it is not possible without significant additional field work and aerial photograph interpretation, to split this unit and other units like it. Therefore, we have left these units as is. They are identified on the paper maps and in a notes column attached to the polygon attribute table of the digital maps. This information has also been stored as a separate point coverage, however the coordinates used for the label points are only estimations taken from a visual interpretation of their location on the original published map.

The map units in this survey also include soil complexes. A soil complex consists of two or more dominant soils which occur in an intricate pattern that can’t be separated at this scale of mapping without unwarranted effort.

There are two maps for this report in circulation. The map that accompanies this report has polygons coloured according to the different map units identified. The second map, which is intended solely for DPIWE in-house circulation, has map units coloured according to the Australian Soil Classification for the dominant SPC within each unit, no colour is assigned to a map unit if a SPC has not been identified.

Legend

Where possible the dominant soil of each map unit has been classified to soil order using the Australian Soil Classification (Isbell,1996). Soils have also been classified according to Great Soil Group (Stace *et al.*, 1968).

Edits to the Sorell Report

The Sorell report has been reformatted to provide a more consistent structure with other similar reports. The soil terminology used within the Sorell report has been updated to be consistent with the Australian Soil and Land Survey Field Handbook (McDonald *et al*, 1990), old imperial measurements have been converted to the metric system and sentence structure has been changed where it did not read with clarity. Edits and additional information about the soils within map units has been recorded within the main body of this report. All the changes made to the report are shown in italics.

No changes have been made to Land Use within this report. This information is out of date and is an area that has been identified as requiring further work.

Laboratory Analysed Data

C.S.I.R.O laboratory data is available for some of the dominant soils identified on this map. Readers should be aware that some of the laboratory methods used by C.S.I.R.O in the 1950’s and 1960’s differ from the methods used in more recent DPIWE laboratory analyse. All CSIRO sites have the character “H” at the beginning of the profile number eg H68. An outline of the different methods used is located in Appendix 2.

Future Work

Correlation of the soils identified on this map with others in southern Tasmania has been extremely difficult due to the lack of existing soil profile data, the complexity of geology and local climate and topography variations. Except for the soils formed on basalt and dolerite, very little is known about the soils within this map sheet. Consequently a number of areas exist where additional work would be valuable.

Alluvial Soils

The alluvial soils are important agriculturally, however very little is known about their properties or appropriate management. The soils within this unit vary considerably from agriculturally productive soils within the modern floodplain to saline waterlogged soils of swampy tidal flats. Further work is needed to differentiate the soils of this unit and provide land users and planners with more detailed information about their properties and behaviour under different land uses.

Soils on Triassic and Permian Sediments

The soils of the Permian and Triassic mudstone, sandstone, shale and siltstone are variable. The Permian soils in the west of the sheet are acidic relatively shallow stony soils with imperfect drainage. However in the east of the sheet the soils within the mudstone unit are variable due to the complex lithology and higher rainfall. The Triassic soils vary across the sheet from well drained sands to swampy water logged soils. Many of the soils formed on the Permian and Triassic sediments are sodic to varying degrees, making them prone to dispersion and, on steeper slopes, erosion. These soils are currently used for grazing, forestry and urban development. More work is required on these soils as their erosion risk has important land use implications.

Land Use

As mentioned previously no edits have been made to the land use section of this report. A more detailed description of land use and vegetation within the Sorell area may be found in Davies (1988), Land systems survey of southern Tasmania. A land capability survey of the Nugent 1:100 000 sheet, of which the Sorell soil map covers the southern half, should be available to the public at the end of 2000. This survey will provide more information on land use within this map sheet.

Accuracy of Maps

Base data on the original Buckland Reconnaissance Soil Map was supplied by the Department of Lands and Survey, Hobart, in 1942. The original map used the Transverse Mercator Projection with co-ordinates displayed in yards. Soil boundaries were delineated by stereoscopic interpretation of aerial photographs. The old paper soil maps were transferred to electronic form in the early 1990s with the co-ordinate system converted to the Australian Map Grid, however no projection was recorded. Accuracy checks of the Buckland digital map have revealed a range of spatial errors. The coastline was incorrect and rivers and estuaries have changed position over time. However the major source of spatial error on all the Reconnaissance Soil Maps has been caused by the absence of rectification of the aerial photographs during delineation of line work. Hence, Ground Control Points (GCP) in some areas on the map sheet, eg hilltops, do not match current true ground positions.

We have not had the resources or time to address all the inaccuracies within this map sheet. Corrections have been made to the coastline only and users need to be aware that in some areas the boundaries of map units may be out by considerable distances.

Appendices

A series of appendices have been attached providing additional information relevant to this report and the accompanying soil map. Much of this information was either unavailable or not recorded with the original report by Loveday.

CONTENTS

List of Figures

List of Tables

C.S.I.R.O.
Division of Soils

Divisional Report 10/55

RECONNAISSANCE SOIL MAP OF TASMANIA

SHEET 83 - SORELL

By
John Loveday

1. INTRODUCTION

This report forms part of the "Reconnaissance Soil Map of Tasmania" series. The *original* soil map which is the main feature of this report was released at a scale of *1:63 360. The revised version of the map accompanying this report is at a scale of 1:100 000.*
The maps are issued in this preliminary form essentially for local use. Discussion of the soils is limited to a brief explanation of the map, and further information is left to intended future publications. The survey of the *Reconnaissance series* is being intensified and the maps when finally published may be in revised form. However in most cases, although the soil units are likely to be re-defined, major soil boundaries will be altered only slightly.

2. PHYSICAL ENVIRONMENT

2.1 Geology & Geomorphology

Of this map sheet about half is sea and half is land. As elsewhere in Tasmania the coastline, one of submergence followed by slight emergence, is very intricate with estuaries, lagoons, bays, sandspits, tall cliffs and small offshore islands. Although the land is mostly hilly there is not much country above *305m*. The main centres of agriculture are in the Sorell and Bream Creek districts, and a large percentage of the total area is under natural eucalypt forest.

The most extensively exposed rock is Jurassic dolerite which intruded the Permian and Triassic sandstones and mudstones *(see Appendix 2).* The Tertiary basalts, particularly around Sorell and at Ragged Tier, are remnants of former more extensive flows *which have been eroded to produce a landscape of undulating low hills in the west of the sheet. East of Forcette the landscape becomes steeper and higher. Moderately steep and rugged hills of dolerite and mudstone predominate. These hills enclose several basin like areas of softer sandstone interbedded with mudstones and shale (Gulline, 1982).* Alluvium fills the floor of some valleys, notably that of the Orielton Rivulet, and at intervals around the coast where streams issue forth from the hills, are narrow alluvial plains. A small patch of lateritised sediments, presumably of Tertiary age, occurs on the narrow neck of land at Dunalley. A feature of the south-western coastline areas is the blown sand which covers slopes up to a distance of about *3km* inland. Marion Beach and Seven Mile Beach are long spits of more recent sand accumulations.

2.2 Climate

Rainfall is at a minimum of *500mm* in the north-western part *of the sheet*, and increases to between *750 and 1000mm* in the more elevated eastern areas. There are no temperature recording stations but the mean annual temperature throughout is probably in the vicinity of *12° C.*

3. SOIL MAP UNITS AND SPC'S

3.1 Soils on Basalt

3.1.1 Krasnozems with Hydromorphic Soils on Basalt (K)

These soils are found on the elevated basalt area around Ragged Tier. Slopes vary from gentle to steep and are often stony. On many slopes slumping has occurred producing numerous benches. Hydromorphic soils have developed on the slumped areas due to the restriction of drainage.

On the freely drained sites the soil is a deep friable clay with a strongly developed granular structure, particularly in the surface horizon. The colour varies from red-brown *(Copping Clay Loam)* to dark-brown *(Bender Clay Loam)* and in the red-brown types some concretionary ferruginous gravel is present. The red-brown types are generally deeper, less stony *and have a finer texture* than the dark-brown *soils.*

On slump benches with restricted drainage a range of soils showing various degrees of hydromorphism have developed. The most strongly developed hydromorphic soil has a surface horizon of dark grey-brown clay loam merging into a grey-brown sub-surface with considerable concretionary ferruginous gravel. There is a sharp change at about *60cm* to a strongly mottled sticky clay. The less strongly developed soils have less ferruginous gravel in the sub-surface and weaker mottling in the subsoil.

One area of krasnozem soils on dolerite, too small to delineate at this scale of mapping, was noted on Forestier Peninsula. It is possible that there are more extensive areas in the inaccessible parts of the Peninsula.

Land Use

In the Ragged Tier area the natural eucalypt forests have been cleared, and where slopes are not too steep and stony fairly intensive farming, particularly dairying, is now practised.

Correlation

Due to it's inaccessibility no field work was done in this unit. However Loveday (1957) identified type profiles for the Copping Clay Loam and the Bender Clay Loam, these have been added to the report. No type profile is available for the hydromorphic soils, for a more detailed description of this soil refer to Loveday (1957).

Copping Clay Loam Type Profile H79

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**Total P (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
Eastfield	H125	A1	0-6	5.2	0.002	1.7	0.092	18	1.8	1.6	0.21	0.12
527312E	H125	A21	6-10	5.3	0.001	1	0.076	13	1.1	1.5	0.27	0.07
5247131N	H125	A22	10-13	5.5			0.061					
	H125	B21g	17-25	5.6	0.002	0.89	0.049	18	6.5	10.5	1.02	0.05
	H125	B22g	25-41	5.6								
	H125	B23	41-53	5.6					3.8	6.2	1.7	0.06
	H125	B24	61-76	6.7								
	H125	B25	94-107	7.7					7.6	8.9	3.5	0.09

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (µm) (%)**	**Sand Coarse >200 (µm) (%)**	**Sand Fine <200 (µm) (%)**	**Silt (%)**	**Clay (%)**
Eastfield	H125	A1	0-6	37.3	33	1.9	1.13	1	9	65	14	8
527312E	H125	A21	6-10	29.4	32	2.9	0.73	1	9	65	15	9
5247131N	H125	A22	10-13					15	16	58	14	10
	H125	B21g	17-25	18.07	68	3.8	0.62	4	12	49	9	31
	H125	B22g	25-41					3	14	42	8	35
	H125	B23	41-53	11.76	63	9.1	0.61	13	18	39	9	33
	H125	B24	61-76					50	45	28	15	9
	H125	B25	94-107	20.09	93	16.1	0.85	60	54	25	11	8

Table 2 Cont.

Figure 1: Copping Clay Loam type profile

Profile H79 Cont

COPPING Krasnozem Uf5.22 basalt H79/CSIRO/279 565418E 5261068N PEMBROKE

Sample Layer	Depths Upr cm	Lwr cm	pH 1:5 H2O	PH 1:5 CaCl	EC 1:5 dS/m	Soluble Chloride mg/kg	Exchangeable Cations Ca meq	Mg meq	K meq	Na meq	Exch H meq	Exch Al meq	ECEC Sum meq	CEC Meas meq	TEB Sum meq	Base Sat %	ESP %	Ca/Mg Ratio
A11	0	5	5.9			< 100 A	21.3	6	1	.4 A	42.9 B		71.6		28.7	40	.6 B	3.55
A11	0	5									21 C							
A12	5	15	5.9			< 100 A								38 A				
A3	15	23	5.9			< 100 A								35 A				
B1	23	34	5.9			< 100 A	10.9	3.3	.14	.38 A	22.8 B		37.52		14.72	39	1.0 B	3.30
B1	23	34									9.2 C							
B21	38	48	6.2			< 100 A												
B22	51	61	5.9			< 100 A	5.7	5.6	.13	.55 A	20.8 B		32.78		11.98	36	1.7 B	1.02
B22	51	61									8.9 C							
B23	66	81	5.2			< 100 A												
B24	84	99	5.1			< 100 A								27 A				
B25	99	114	5.1			< 100 A												
B31	127	140	5.0			< 100 A												
B32	152	163	5.5			< 100 A												

Sample Layer	Depths Upr cm	Lwr cm	Loss Ign %	Organic Carbon %	Total N %	C/N Ratio	Avail N mg/kg	Air Dry Moi%	Grav Moi%	Total P %	Avail P mg/kg	Extract P mg/kg	Total K %	Avail K mg/kg	Extract K meq
A11	0	5	22.6		.61 A			8		.368 A					
A11	0	5													
A12	5	15	20		.49 A			8.5		.365 A					
A3	15	23	16.2		.343 A			10.							
B1	23	34	12.2		.204 A			7.8		.322 A					
B1	23	34													
B21	38	48													
B22	51	61	11.2					7.4		.238 A					
B22	51	61													
B23	66	81													
B24	84	99	13.2					9							
B25	99	114	13.3					11.		.278 A					
B31	127	140													
B32	152	163						9.9		.47 A					

Sample Layer	Depths Upr cm	Lwr cm	<------Extractable--------> Cu	Mn mg/kg	Zn	Fe	B mg/kg	Free Fe %	Extractable Al %	Si %	Total Fe %	Total S %	Avail SO4-S mg/kg	CaCO3 %	Dispersion Particle Size GV %	CS %	FS %	S %	C %
A11	0	5						5.03 A			14 C				7	4	20	18	39 C
A11	0	5																	
A12	5	15																	
A3	15	23																	
B1	23	34						6.92 A			20 C				36	16	22	17	35 C
B1	23	34																	
B21	38	48																	
B22	51	61						9.79 A			18.1 C				13	4	22	23	46 B
B22	51	61																	
B23	66	81																	
B24	84	99																	
B25	99	114																	
B31	127	140																	
B32	152	163																	

Figure 1 Cont

Bender Clay Loam Type Profile H80

CSIRO Soil Surveys (1949-70)

SITE DESCRIPTION

Site Number:	H80	Property Name:		Runoff:	Rapid
Project Code:	CSIRO	Property Owner:		Permeability:	Moderately permeable
Map Scale:	1: 100,000	Nearest Town:	PEMBROKE	Drainage:	Well drained
Sheet No:	8412	Describer:	John Loveday	Elevation:	396 m
Map Name:		Date Cored:	29 Jan 1954		
AMG Easting:	568159 E	Rainfall:	840 mm	Soil Class:	BENDER
AMG Northing:	5262896 N	Air Temp (3pm):		Northcote PPF:	Um6.24
Film No:	3178	Type of Site:		Great Soil Group:	Krasnozem
Run No:	2	Type of Desc:	Soil pit	Soil Taxonomy:	
Frame No:		Soil Samples:	Yes	Land Capability:	
State:	Tasmania	Soil Photos:	Yes	Geological Map:	

Landform: Element steep, bench; Pattern hills;
Land Surface: Slope angle 30.6 %; complete clearing - pasture but never cultivated; Rock Outcrops <2% bedrock exposed, Basalt;
Vegetation:
Substrate: basalt;

HORIZON DESCRIPTIONS

A11	0	4	cm	Moderately moist; dark brown (7.5YR 3/2 moist); clay loam; granular structure; weak (moist); few (2-10%) basalt coarse fragments; abundant fine (1-2mm) live roots; 6 field pH; diffuse (>100mm) boundary;
A12	4	13	cm	Moderately moist; dark brown (7.5YR 3/2 moist); clay loam; granular structure; weak (moist); few (2-10%) <2mm ferruginous; common (10-20%) stones (60-200mm) basalt; fine (1-2mm) live roots; 6 field pH; diffuse (>100mm) boundary;
A13	13	23	cm	Dry; dark brown (7.5YR 3/2 moist); clay loam; granular structure; weak (dry); few (2-10%) ferruginous; many (20-50%) basalt coarse fragments; fine (1-2mm) live roots; 6.6 field pH; diffuse (>100mm) boundary;
A14	23	38	cm	Dry; dark brown (7.5YR 3/2 moist); clay loam; granular structure; weak (dry); few (2-10%) ferruginous; many (20-50%) basalt coarse fragments; fine (1-2mm) live roots; 6.4 field pH; diffuse (>100mm) boundary;
A3	38	46	cm	Dry; dark reddish brown (5YR 3/3 moist); clay loam; weak granular structure; weak (dry); few (2-10%) ferruginous; many (20-50%) basalt coarse fragments; 6.4 field pH; diffuse (>100mm) boundary;
B21	48	58	cm	Dry; reddish brown (5YR 4/3 moist); medium clay; granular structure; weak (dry); many (20-50%) basalt coarse fragments; 6.3 field pH; diffuse (>100mm) boundary;
B22	61	76+	cm	Reddish brown (5YR 4/3 moist); medium clay; abundant (50-90%) basalt coarse fragments; 6.5 field pH;

Profile Note: Bender clay loam ; Field pH has been copied from Lab data.

Figure 2: Bender Clay Loam type profile

Type Profile H80 Cont.

BENDER Krasnozem Um6.24 basalt H80/CSIRO/280 568159E 5262896N PEMBROKE

Sample Layer	Depths Upr cm	Depths Lwr cm	pH 1:5 H2O	PH 1:5 CaCl	EC 1:5 dS/m	Soluble Chloride mg/kg	Exchangeable Cations Ca meq	Mg meq	K meq	Na meq	Exch H meq	Exch Al meq	ECEC Sum meq	CEC Meas meq	TEB Sum meq	Base Sat %	ESP %	Ca/Mg Ratio
A11	0	4	6.0			100 A								50 A				
A12	4	13	6.0			< 100 A	30.1	9.8	2.35	.31 A	56 B		98.56		42.56	43	.3 B	3.07
A12	4	13									27.1 C							
A13	13	23	6.6			< 100 A								50.5 A				
A14	23	38	6.4			< 100 A	28.2	9.4	2.2	.48 A	38 B		78.28		40.28	51	.6 B	3.00
A14	23	38									14.6 C							
A3	38	46	6.4			< 100 A								40.5 A				
B21	48	58	6.3			< 100 A	16.9	14.3	1.13	.72 A	23 B		56.05		33.05	59	1.3 B	1.18
B21	48	58									9.4 C							
B22	61	76	6.5			< 100 A												

Sample Layer	Depths Upr cm	Depths Lwr cm	Loss Ign %	Organic Carbon %	Total N %	C/N Ratio	Avail N mg/kg	Air Dry Moi%	Grav Moi%	Total P %	Avail P mg/kg	Extract P mg/kg	Total K %	Avail K mg/kg	Extract K meq
A11	0	4	29.4	11.1 C	.97 A	11		10.		.354 A					
A12	4	13	29.5	8.8 C	.77 A	11		10.		.228 A					
A12	4	13													
A13	13	23	26	7.9 C	.615 A	13		12.							
A14	23	38	22.8	6.1 C	.488 A	13		11.							
A14	23	38													
A3	38	46	19.1	3.6 C	.271 A	13		8.6							
B21	48	58	14.7	1.5 C				8.5		.171 A					
B21	48	58													
B22	61	76													

Sample Layer	Depths Upr cm	Depths Lwr cm	Extractable Cu mg/kg	Mn	Zn	Fe	B mg/kg	Free Fe %	Extractable Al %	Extractable Si %	Total Fe %	Total S %	Avail SO4-S mg/kg	CaCO3 %	Dispersion Particle Size GV %	CS %	FS %	S %	C %
A11	0	4																	
A12	4	13						5.03 A			14 C				8	5	19	27	27 C
A12	4	13																	
A13	13	23																	
A14	23	38						6.99 A			15.6 C				11	7	21	23	29 C
A14	23	38																	
A3	38	46																	
B21	48	58						7.13 A			15.8 C				35	15	23	24	29 C
B21	48	58																	
B22	61	76																	

Figure 2 Cont

3.1.2 Shallow Red-Brown Soils on Basalt (RBb)

In the rainfall zone between about *630mm and 760mm* the soils formed on basalt are red-brown to dark reddish-brown and generally shallow and stony. They are intermediate in distribution and character between the black soils on basalt and the krasnozems on basalt. They occur in a number of relatively small patches on ridge or hill tops, but the slopes are generally gentle.

The surface of the dominant soil (*Stoneleigh SPC)* is a dark reddish-brown friable clay loam sometimes fine sandy due to wind-blown accessions. There are usually basalt floaters and some tiny black ferruginous concretions. The subsoil at about *30cm* is a reddish or red-brown clay often friable but sometimes plastic in the moist state. Beyond about *45cm* the clay merges with decomposing basalt.

Land Use

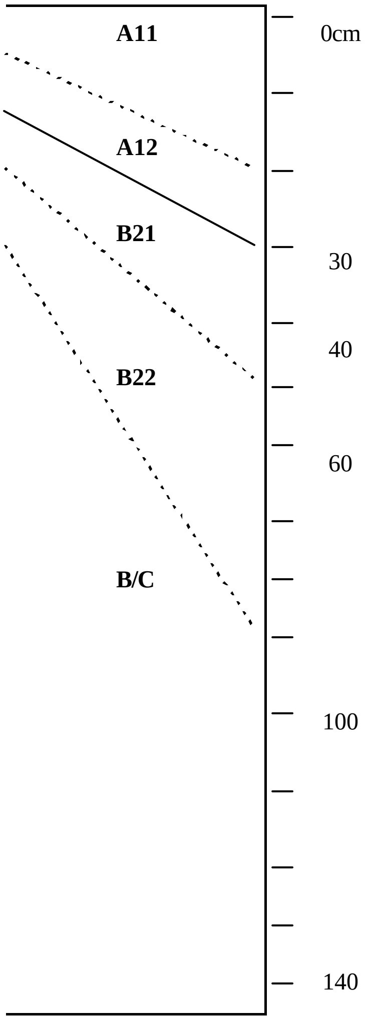
The natural vegetation, which on these soils was probably an open sclerophyll forest, has been removed and fairly intensive mixed farming is now practised.

Correlation

A SPC of the dominant soil has been defined.

Stoneleigh Soil Profile Class

Concept	**A stony, shallow, well drained friable reddish brown clay loam surface over a red-brown clay subsoil.**
Aust. Soil Classification	Red Ferrosol
Great Soil Group	Prairie soil, chocolate soil.
Principal Profile Form	Dr
Mapping Units	RBb
Geology	Tertiary Basalt
Landform	Upper part and crests of gently sloping hillslopes on low hills
Vegetation	Mostly cleared
Permeability	Slowly permeable
Drainage	Well drained



A11: Red (5YR 3/3, 4/3, 10YR3/2); clay loam to clay loam fine sandy; granular structure; weak (moist) consistence; few <2mm to 6mm ferruginous or ferromanganiferous concretions; 2-10% basalt gravels; pH 6.0-6.5; diffuse change to

A12: Red (5YR 3/3, 4/3, 7.5YR 2.5/2); clay loam; granular structure; weak (moist) consistence; few <2mm to 6mm ferruginous or ferromanganiferous concretions; 10-50% basalt stones; pH 6.0-6.5; sharp change to

B21: Red or occasionally brown (5YR ¾, 4/3, 10YR 3/2) medium clay; granular (occasionally blocky or massive) structure; weak (moist) consistence; few ferruginous concretions; 10-20% basalt coarse fragments; pH 6.0-7.0; diffuse change to

B22: Red (2.5YR 3/4, 3/2, 10YR 4/); medium clay; granularoccasionaly blocky or massive) structure; very firm (dry) consistence; few <2mm ferromanganiferous concretions; 20-50% basalt gravels; pH 6.0-7.5; diffuse change to

B/C: Red (2.5YR 3/4); medium clay; granular structure; very firm (dry) consistence; few ferromanganiferous concretions; 50-90% basalt coarse fragments; pH 7.0.

Stv **Stoneleigh fine sandy clay loam variant**

A1: To 50cm depth, same as A11, A12 apart from having a tinge of grey colour, a fine sandy clay loam to clay loam fine sandy texture; massive structure; strong (dry) consistence, 5.5 to 6.5 pH, sharp change to

B: To 70cm depth, same as B21, B22 apart from, brown (10YR 4/3) colour; heavy clay; massive structure; very firm (moist) consistence, pH 6.3

Morphological Sites: CSIRO H81, H68
Analysed Sites: CSIRO H81, H68
Related soil names: Stoneleigh Clay Loam
Previously described by: Loveday (1955c), Loveday (1957), Dimmock & Loveday (1958)

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Avail P (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K	Free Fe	Total Fe
Stoneleigh	H81	A11	0-5	6.7		0.172		3.8	0.41	9	18.9	11.2	0.9	0.31	6.01	14.2
551814 E	H81	A12	5-13	6.6		0.132		3.5	0.37	9	17.1	9.5	0.82	0.16	6.36	14
5264881 N	H81	B21	13-18	6.9				2.4								
	H81	B22	18-30	7.3		0.113		1.5	0.28	9	15.9	14.4	1.1	0.13	6.15	15
	H81	BC	30-41	7.3												
Stoneleigh	H68	A11	0-8	5.7		0.089		2.6	0.261	10	8.4	1.9	0.52	0.29	6.08	18.4
554547 E	H68	A12	8-15	5.8		0.079		2.1	0.215	10					4.68	18.1
5264860 N	H68	A13	15-25	6.1				1.6	0.133	12	10.8	0.73	0.26	0.1	5.17	18.1
	H68	A14	28-43	6.3				1.1								
	H68	A15	43-53	5.9											6.22	20.4
	H68	B2	58-69	6.3							13.1	1.47	0.92	0.13		
	H68	BC	69-84	6.2												

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt (%)	Clay (%)
Stoneleigh	H81	A11	0-5			63	1.8	1.69	23	5	24	33	27
551814 E	H81	A12	5-13			63	1.9	1.80	18	3	21	30	32
5264881 N	H81	B21	13-18		32.5								
	H81	B22	18-30			68	2.4	1.10	16	4	22	27	43
	H81	BC	30-41										
Stoneleigh	H68	A11	0-8			43	2.0	4.42	3	17	28	32	16
554547 E	H68	A12	8-15		16.9								
5264860 N	H68	A13	15-25			53	1.2	14.79	5	9	27	35	17
	H68	A14	28-43		17								
	H68	A15	43-53		22.8				33	13	30	38	12
	H68	B2	58-69			35	2.0	8.91	31	4	19	36	37
	H68	BC	69-84										

Table 1 Analytical data for Stoneleigh SPC

3.1.3 Black Soils on Basalt (Blb)

The black soils on basalt are located in the Sorell district and south of Bream Creek. They are formed on gentle and moderate slopes of undulating hills. The dominant soil (*Sorell SPC)* has a near black clay or clay loam surface, frequently with a granular “self mulching” structure but sometimes more coarsely structured. Deep surface cracking may be evident in the dry season. There is a gradual change to the dark yellow-grey or dark brown sub-soil clay and this in turn merges with decomposing basalt which occasionally has streaks of lime through it. *A Dark brownish grey clay over a weakly mottled yellowish grey clay (Kornhill Clay, Loveday, 1957) is found along drainage lines in the Sorell area.*

Land Use

Formally the soils of the Sorell district were noted for wheat growing, but now they are used for fairly intensive mixed farming with little or no wheat growing.

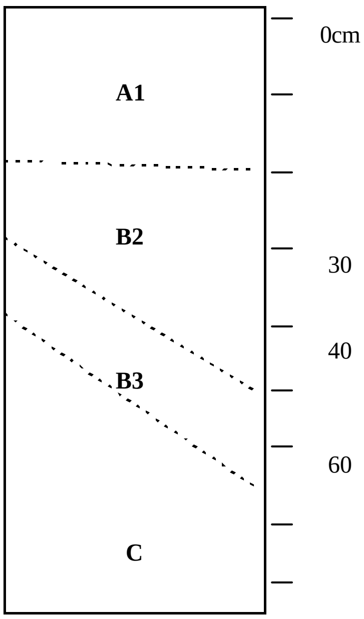
Correlation

The Black Soils on Basalt (Blb) has been split into 2 units. The Blb1 unit occurs in the west of the soil map where the basalt forms low rolling hills dominated by the Sorell SPC. In the east of the sheet two dominant soils are evident (Loveday, 1957). The Sorell SPC and a freely drained dark grey-brown clay over a greyish brown firm clay, called the Allenby Clay. The Allenby Clay is found on the steeper slopes and ridges whereas the Sorell SPC is found on the gentler lower slopes. No SPC or type profile is available for the Allenby clay. However because this unit has a co-dominant soil not identified in the west of the map, this unit can not be correlated with the Blb1 map unit and has therefore been renamed Black and Grey Brown Soils on Basalt (Bgb).

Some of the soils within the Blb1 near Pitt Water have an accumulation of wind blown sand in their surface horizons.

Sorell Soil Profile Class

Concept	**Shallow black friable clay on upper slopes of basaltic hills**
Aust. Soil Classification	Black Vertosol or Melanic-Vertic Black Dermosol
Great Soil Group	Prairie Soil or Black Earth
Principal Profile Form	Gn, Ug
Mapping Units	Blb1 & Blb2
Geology	Tertiary Basalt
Landform	Upper part of gentle undulating low hills or hills
Vegetation	Mostly cleared or Savannah Woodland
Permeability	Very slowly to slowly permeable
Drainage	Moderate to imperfectly drained
Land Capability	Class 4 with a wetness



A1: Black (10YR 2/1, 2/2, 3/1), light clay to clay loam, weak sub angular blocky structure breaking to fairly friable granular structure, strong to firm (moist) consistence; 2-10% coarse gravels; pH 5.8 - 7.0; gradual change to

B2: Black (10YR 2/1, 3/1, 3/2); medium to heavy clay; angular blocky to weak coarse prismatic structure; very firm to strong consistence (moist); occasionally very few ferruginous concretions; 2-10% coarse gravels; pH 6.0 - 7.0; gradual change to

B3: Black or Brown (2.5Y 3/2, 3/3, 5Y 3/1, 3/2); medium to heavy clay; massive structure; very firm (moist) consistence; none to few 6-20mm ferruginous concretions; 2-10% medium gravels; pH 7.0 to 7.5; gradual change to

C: Decomposing basalt marl; decomposing basalt stones occasionally coated in a calcareous skin; and/or basalt stone

Morphological Sites: CSIRO H69, H77, H82
Analysed Sites: CSIRO H69, H77, H82
Related soil names: Sorell clay
Previously described by: Loveday (1955c), Loveday (1955b), Loveday (1957), Dimmock (1957), Dimmock & Loveday (1958)

Soil Profile Class Grid Referenece	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Avail P (mg/kg)	Avail K (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
Sorell	H82	A11	0-4	6.8		420			2.7	0.261	10	20.9	18.8	2.7	0.2
546353 E	H82	A12	4-15	7.1		380			2.3	0.24	10				
5263077 N	H82	A13	15-28	8.2					1.5	0.167	9	25.2	28.8	6.9	0.14
	H82	B2	30-41	8.9					1.5						
	H82	BC	46-56	9.5											
	H82	C	63-76	9.2											
Sorell	H69	A11	0-6	6.2		920			4.1	0.39	11	18.1	14.2	1.8	0.28
547711 E	H69	A12	6-16	6.3		950			3.4	0.32	11				
5263068 N	H69	A13	19-29	6.9					1.8	1.87	1	16.5	18.5	3.6	0.3
	H69	A14	29-38	7.3		770			1.4	0.154	9				
	H69	AC	38-48	7.4											

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt (%)	Clay (%)
Sorell	H82	A11	0-4	42.6	54.7	78	4.9	1.11	0	2	27	27	40
546353 E	H82	A12	4-15						0	2	25	26	38
5263077 N	H82	A13	15-28	61.04			11.3	0.88	0	2	23	19	51
	H82	B2	30-41										
	H82	BC	46-56										
	H82	C	63-76										
Sorell	H69	A11	0-6	34.38	56.18	61	3.2	1.27	1	4	30	31	28
547711 E	H69	A12	6-16						11	4	28	26	39
5263068 N	H69	A13	19-29	38.9	52.4	74	6.9	0.89	18	3	23	23	47
	H69	A14	29-38						8	4	13	19	62
	H69	AC	38-48										

Table 2 Analytical data for Sorell SPC

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	pH water (1:5)	EC (d/sm)	Total P (mg/kg)	Avail P (mg/kg)	Avail K (mg/kg)	Org. Carb. (%)	Total N (%)	C/N Ratio	Ca	Mg	Na	K
Sorell	H77	A11	0-9	5.8		820			8.1	0.6	14	33.5	15.7	0.86	0.34
547723 E															
5264911 N	H77	A12	9-18	5.9		670			6.8	0.5	14	32.5	12.1	0.68	0.22
	H77	A13	18-25	6.1		390			4.8	0.3	16	28	16	0.89	0.21
	H77	A14	29-38	6.5					3.9	0.22	18	31.9	18	0.96	0.22
	H77	A15	38-48	6.8											
	H77	B2	48-63	7.6		360			1.5	0.1	15	32	28	1.96	0.26
	H77	BC	67-71	8.3		1990									
	H77	C	71-79	8.2		1620						25.3	20.9	2	0.1

Soil Profile Class Grid Reference	Profile Number	Horizon	Sample Depth (cm)	Total Bases	CEC	BASE SAT (%)	ESP (%)	Ca/Mg Ratio	Gravel (of total) >2000 (um) (%)	Sand Coarse >200 (um) (%)	Sand Fine <200 (um) (%)	Silt (%)	Clay (%)
Sorell	H77	A11	0-9	50.4	77.2	65	1.1	2.13	0	1	25	25	40
547723 E	H77	A12	9-18	45.5	72.9	62	0.9	2.69	3	1	24	21	39
5264911 N	H77	A13	18-25	45.1	66.6	67	1.3	1.75	5	1	25	28	39
	H77	A14	29-38	51.08	65.98	77	1.5	1.77	0	1	25	26	47
	H77	A15	38-48										
	H77	B2	48-63	62.22	68.42	89	2.8	1.14	0	1	21	23	52
	H77	BC	67-71										
	H77	C	71-79	48.3			4.1	1.21	4	7	29	33	30

Table 2 Cont

3.2 Soils on Dolerite

3.2.1 Podzolic Soils on Dolerite (Pd)

These soils occur extensively in the eastern part of the sheet where rainfall exceeds *630mm* in typically rather rugged hilly country. Slopes vary from gentle to steep and are usually stony with many loose dolerite boulders and some outcrops. The surface soil is grey-brown sandy loam or fine sandy loam over a bleached sub-surface which contains varying but sometimes large amounts of ferruginous gravel. There is a sharp change to the mottled light yellow-grey and yellow-brown subsoil clay, which at depth gradually merges into a mealy and gritty decomposing dolerite. Dolerite stones occur throughout the profile. The subsoil is usually rather dense and sticky in the moist state, but in the higher rainfall parts of the Forestier Peninsula, subsoils of a more open friable clay are sometimes encountered.

Small patches of shallow, stony, brown loam soils are found on some hilltops and are mapped with this group. Also included are some areas of soils which are transitional to the black soil group *(Belmont SPC)* discussed in section 3.3.2.

Land Use

The natural vegetation is a sclerophyll forest with a ground flora of native grasses, tussocks and heath plants, and provides rough grazing for sheep. However where slopes are not too steep and stony these soils are capable of development for improved pastures.

Correlation

The Podzolic Soils on Dolerite (Pd) map unit is dominated by the Eastfield SPC and has been renamed Podzolic Soils on Dolerite 1 (Pd1) with the Pd unit on Forester Peninsula being renamed Podzolic Soils on Dolerite 2 (Pd2).

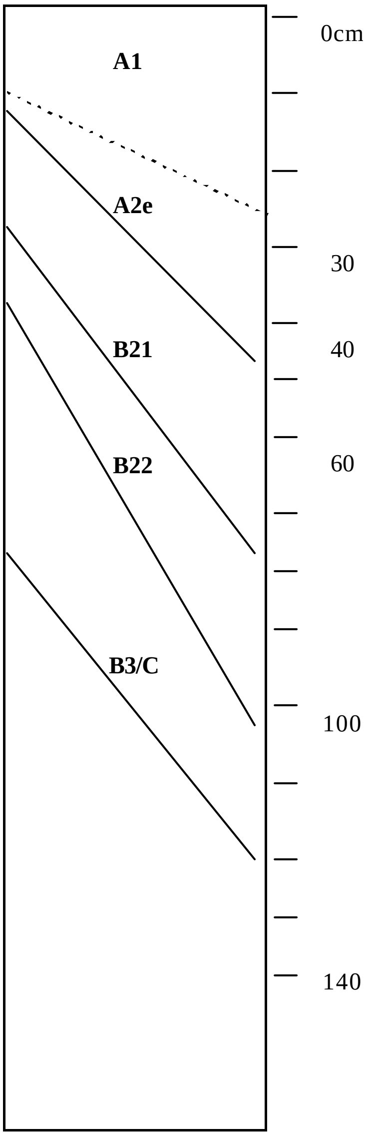
Ground observations within this map unit have been limited by the inaccessibility of much of the unit. This unit covers a rainfall range from 600mm to 1000mm and a elevation range of 50m to 600m. Consequently the soils are quiet variable within this unit. On the steep dolerite slopes a very shallow stony texture contrast soil without an A2 was common. As slope angle decreased the soils became deeper and less stony with a bleached A2 horizon dominated by ferruginous gravels becoming evident.

Where rainfall was slightly higher these soils tended to be acidic (Kurosols) with more friable and gradational profiles becoming evident when rainfall exceeded 800mm. Friable gradational soils where observed by Loveday on Forester Peninsula and by this author in the more rugged north east of the sheet. These soils, where free iron is greater then 5% are Ferrosols. On the original map the majority of Forester Peninsula was mapped as one unit called Podzolic Soils on Dolerite. However Loveday identified areas within this unit where Podzolics Soils on Mudstone, Black soils on Dolerite and Podzols on Cover Sands were observed in the field. In the east of the unit Loveday was unable to determine which soils were dominant due to the ruggedness of the terrain and subsequently mapped this part of the unit as "probably Pd with some Pm and other soils". Due to the variability of the soils within this unit it has been renamed and called Podzolic Soils on Dolerite 2 (Pd2).

Generally the soils within the Pd unit are neutral to slightly acidic texture contrast soils (Chromosols) which are morphological and generally chemically similar to the Eastfield SPC *described in the north of the state. The lack of Sodosols observed within this unit compared to the north may be more a reflection of the lack of available data.*

Eastfield Soil Profile Class

Concept	**Brown, mottled, texture contrast soils with dolerite fragments throughout, loamy topsoils, sandy sub-surface, with ironstone, and clayey subsoils developed on dolerite hills**.
Aust. Soil Classification	Brown Chromosols and Sodosols
Great Soil Group	Grey-Brown Podzolics & Soloths
Principal Profile Form	Db, Dd
Mapping Units	Ea, Ea-Bo, Ea-Bm, Pd
Geology	Jurassic Dolerite
Landform	Moderate to steeply undulating hills
Permeability	Slowly permeable
Drainage	Imperfectly drained
Land Capability	Class 5 or 6



A1: Grey to black (10YR 2/1, 3/1, 3/2, 4/1, 4/2, 5/2); sandy loam to loam massive or weak structure, 2-10mm, subangular blocky structure, very weak to weak (moist) consistence, very few, 2-6mm, ferruginous concretions, variable amounts of dolerite stones and boulders; pH 5.5 - 7.0; clear to gradual change to

A2e: Conspicuously bleached (10YR 4/2, 5/1, 5/2, 6/2 fine loamy sand to fine sandy loam or silty sandy loam; single grain or massive structure; very weak to weak (moist) consistence; common to abundant, <2-6mm, ferruginous concretions, variable amounts of dolerite gravels, stones or boulders; pH 5.5- 7.0; sharp to abrupt change to

B21: Mottled; brown (10YR 3/4, 4/3, 4/4, 4/6, 5/4); medium to heavy clay; massive to weak or moderate, 50-200mm angular blocky, firm to very firm (moist) consistence; few slickensides; clay skins common; cracks present; very few to few, 2-6mm, ferruginous nodules; variable amounts of dolerite fragments, stones or boulders; pH 6.5 - 7.0; abrupt to clear change to

B22: Mottled brown or red (2.5Y 4/4, 4/6, 10YR ¾, 4/3, 4/4, 4/6, 5/4, 7.5YR 4/4, 4/6, 5YR 3/3); heavy clay; massive to weak or moderate, 50-100mm, angular blocky structure; firm to strong (moist) consistence; very few to few, 2-6mm, ferruginous nodules; variable amounts of dolerite stones and boulders; slickensides and clay skins common; pH 6.5 - 7.5; sharp to clear change to

B3/C: Occasionally mottled; brown (2.5Y 5/4, 5/3, 4/3, 4/4); light to medium clay; strong (moist) consistence; occasionally calcareous soft segregations present; variable amounts of dolerite stones or boulders; slickensides common; pH 7.0-7.5

R: Jurassic dolerite

Morphological Sites: CSIRO H86, H78, H24, H163,:LRRBD L6, 34, 93, 126
Analysed Sites: CSIRO H86, H78, H24, H163: LRRBD L12, 43
Related soil names: Eastfield Series, Eastfield Sand, Type I, Eastfield SPC, Podzolic on dolerite
Previously described by: Stephens et al (1942), Loveday (1955b) & (1955c), Loveday (1957), Dimmock (1957c), Loveday & Dimmock (1958); Doyle (1993), Spanswick et al (1999a & 1999b)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH CaCl (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Avail P (mg/kg)**	**Avail K (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
Eastfield	H86	A11	0-8	6.2					2.6	0.183	14	6	4.4	0.18	0.15
558576 E	H86	A12	8-11	5.9					1.6	0.132	12				
5257431 N	H86	A2	13-18	6.1					0.9	0.072	13	3.4	2.2	0.17	0.13
	H86	B21	20-33	6.4					0.7			10.6	10.8	0.49	0.07
	H86	B22	33-46	7.2						0 041		14.8	18.2	1.1	0.11
	H86	B23	46-56	7.3						0.049					
	H86	BC	63-71	8.1						0.021		26.1	26.5	2.5	0.3
Eastfield	H78	A11	0-8	5.5		0.007			2.3	0.81	13	4.8	1.9	0.21	0.29
556800 E	H78	A12	8-14	5.7					1.4	0.109	13				
5253750 N	H78	A21	14-20						1.1	0.075	15	5.2	1.7	0.23	0.15
	H78	A22	20-25	6.1											
	H78	B1	28-33	6.9		0.005			0.6			6.3	6.6	0.84	0.14
	H78	B2	33-48	7.2											
	H78	BC	48-58	7.7											
	H78	C	58-69	7.7		0.005						10.7	13.9	3.8	0.17

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**CEC**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt (%)**	**Clay (%)**
Eastfield	H86	A11	0-8	10.73	19.23	56	0.9	1.36	0	9	60	15	11
558576 E	H86	A12	8-11										
5257431 N	H86	A2	13-18	5.9	11.1	53	1.5	1.55	45	28	48	16	17
	H86	B21	20-33	21.96	28.46	77	1.7	0.98	11	11	34	12	40
	H86	B22	33-46	34.21	39.21	87	2.8	0.81	20	9	22	9	58
	H86	B23	46-56						45	15	21	8	56
	H86	BC	63-71	55.4			4.5	0.98	12	20	22	13	35
Eastfield	H78	A11	0-8	7.2		42	1.2	2.53	1	8	56	18	12
556800 E	H78	A12	8-14		10								
5253750 N	H78	A21	14-20	7.28		52	1.6	3.06	6	12	54	25	5
	H78	A22	20-25										
	H78	B1	28-33	13.58		73	4.4	0.95	20	14	43	15	27
	H78	B2	33-48										
	H78	BC	48-58	28.57									
	H78	C	58-69			93	12.3	0.77	0	38	21	12	25

Table 3 Analytical data for Eastfield SPC

3.2.2 Black Soils on Dolerite (Bld)

In the drier zone of less than *630mm* a similar range of black soils is found on dolerite as on basalt. However the soils are generally more stony and occur on more hilly country than the basalt black soils. They are often slightly gritty due to fragments of decomposing dolerite, with lime occasionally present in the underlying decomposing dolerite.

On spurs and ridge tops it is common to find shallow and stony brown loam soils which in places extend down the slopes as rather deeper soils with brown clay subsoils.

Land Use

Because of the more frequent outcrops of stone and steeper slopes these soils are not developed to the extent of the podzolics on dolerite. They often carry savannah woodland vegetation, but considerable improvement of the pastures should be possible.

Correlation

The dominant soil of this map unit is the Belmont SPC. This map unit has been renamed Black Soils on Dolerite 1 (Bld1).

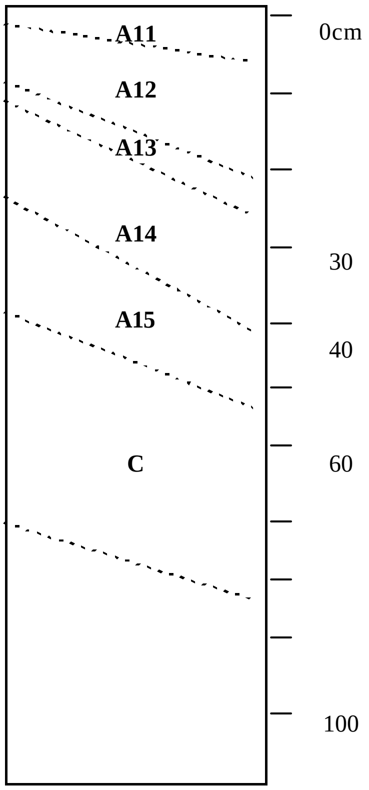
The black soils on dolerite are only found in southern Tasmania on low dolerite hills and in valleys where rainfall is generally less than 600mm. These soils appear to be restricted to a 30km radius of Hobart. Why these soils are mainly restricted to this area is not fully understood. These soils occupy only a small area of the Sorell map sheet, with most of the soils occurring in the north west of the sheet.

The surface horizon of the black soils on dolerite around Pitt Water contained a high percent of wind blown sand. Similar soils are also found on the Hobart and Brighton sheets along the Derwent, Coal and Jordan Rivers.

Chemical data for the Belmont SPC includes sites identified on the Brighton (H174 & H173) and Hobart (H22) Reconnaissance Soil Maps.

Belmont Soil Profile Class

Concept	**Black cracking minimal textural differentiation soils with a clay loam to clay surface and clay subsoil, carbonate often present in subsoil and decomposing rock. Limited to a general extent of 40km from Hobart**
Aust. Soil Classification	Vertic black Dermosol
Great Soil Group	Black Earth or Praire Soil
Principal Profile Form	U or G
Mapping Units	Bld1, Bld1-Bd1, Bld1-Pd1
Geology	Jurassic Dolerite
Landform	Steep to gentle sloping hills
Vegetation	Savannah woodland, mostly cleared
Surface Conditions	Coarse fragments common
Permeability	Slow to moderately permeable
Drainage	Moderately well drained
Land Capability	Class 4



A11: Black or very dark grey (10YR 2/1, 3/1 moist); clay loam to light clay (sometimes sandy); friable 2-5mm granular structure; moderate to weak (moist) consistence; 2-10% dolerite gravels; pH 6.0 - 6.5; diffuse boundary change to

A12: Black or very dark grey brown (10YR 2/1, 3/1moist); clay loam to heavy clay (sometimes sandy); friable 2-5mm granular structure; firm (dry) consistence; 2-10% dolerite gravels; pH 6.5 - 7.0; diffuse boundary change to

A13: Black or grey brown (10YR 2/1, 2.5Y 3/2 moist); heavy clay; moderate 20-50mm angular blocky structure; firm (moist) consistence; 2-10% dolerite gravels; pH 6.5 - 7.5; diffuse boundary change to

A14: Black to brown (10YR 2/1, 3/2 moist); heavy clay; moderate 10-20mm angular blocky structure; firm (moist) consistence; <2% dolerite gravels; pH 7.0 - 7.5; gradual boundary change to

A15: Brown to black (10YR 3/3, 3/1, 2/1 moist); light medium to medium heavy clay; moderate to strong 20-100mm blocky structure; firm (moist) consistence; 20-50% dolerite gravels; pH 6.5-7.0; gradual change to

C: Yellow to Brown (2.5Y 8/3, 10YR 4/3 moist); 20-50% coarse dolerite gravels; calcareous concretions may be present.

Morphological Sites: CSIRO H70, H22, H174, H173, H126; SOILCO 31
Analysed Sites: CSIRO H70, H22, H174, H173, H126
Related soil names: Belmont Clay loam, Black soils on dolerite
Previously described by: Loveday (1955b) & (1955c), Dimmock (1957c),Loveday (1957), Loveday & Dimmock (1958)

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Avail P (mg/kg)**	**Avail K (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
Belmont	H174	A11	0-2	6.3	0.179	0.039			10.9	0.798	14	40.8	4.5	0.26	2.3
529121 E	H174	A12	2-9	6.5	0.107	0.025			7.4	0.483	15	39.5	4.3	0.24	1.7
5272267 N	H174	A13	9-23	6.9	0.086	0.013			2.8	0.204	14	38.4	7.1	0.52	1.1
	H174	B21	23-38	7.1	0.077				1.5	0.114	13				
	H174	B22	38-51	7.6	0.077	0.009			1.1	0.091	12	45.7	12.6	1.3	0.2
	H174	B23	51-63	8.0	0.077				0.71	0.069	10				
	H174	B/C	63-71	8.2	0.077				0.5	0.052	10	41.6	7.4	0.15	1.4
	H174	C	71-81	8.3	0.098				0.39	0.034	11				
Belmont	H70	A11	0-8	6.2		0.017			4.9	0.44	11	18	8.25	1	0.98
547711 E	H70	A12	8-18	6.6					3.9	0.34	11				
5263068 N	H70	A13	18-25	6.8		0.018			2.8	0.228	12				
	H70	A14	28-42	7.6					1.49	0.168		21.1	19.1	5.3	0.25
	H70	AC1	42-51	8.4		0.018									
	H70	AC2	51-61	8.7											
	H70	C	66-81	8.9		0.2						14.2	12	6.9	0.17

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**CEC**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt (%)**	**Clay (%)**
Belmont	H174	A11	0-2			72	0.4	9.07	0	9	28	17	28
529121 E	H174	A12	2-9			76	0.4	9.19	3	10	31	16	31
5272267 N	H174	A13	9-23			86	0.9	5.41	6	7	27	11	53
	H174	B21	23-38										
	H174	B22	38-51			93	2.0	3.63	13	6	23	8	65
	H174	B23	51-63										
	H174	B/C	63-71				2.8	5.62	40	29	21	11	41
	H174	C	71-81										
Belmont	H70	A11	0-8			64	2.3	2.18	3	18	31	21	26
547711 E	H70	A12	8-18		35				18	19	31	20	24
5263068 N	H70	A13	18-25		32.5				25	25	28	16	28
	H70	A14	28-42			90	10.5	1.1	7	18	21	10	47
	H70	AC1	42-51						15	17	16	3	44
	H70	AC2	51-61						29	20	11	4	40
	H70	C	66-81				20.7	1.18	53	47	19	13	15

Table 4 Analytical data for Belmont SPC

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**pH water (1:5)**	**EC (d/sm)**	**Total P (mg/kg)**	**Avail P (mg/kg)**	**Avail K (mg/kg)**	**Org. Carb. (%)**	**Total N (%)**	**C/N Ratio**	**Ca**	**Mg**	**Na**	**K**
Belmont	H173	A11	0-2	6.3	0.092	0.2			8.3	0.539	15	24.9	12.7	0.38	0.99
519902 E	H173	A12	2-10	6.5	0.08	0.13			5.8	0.39	15	23.8	14	0.57	0.36
5271375 N	H173	A13	10-18	6.7	0.071				4.1	0.316	13				
	H173	A14	18-29	7.2	0.08	0.13			2.6	0.202	13	27.5	20.6	1.4	0.3
	H173	A15	29-41	7.6	0.08	0.007			1.7	0.14	12	28.9	25.2	1.7	0.28
	H173	AC1	41-48	8.0	0.11				1.4	0.11	12				
	H173	AC2	48-58	8.2	0.131				1.3	0.11	12	28.4	27.9	2	0.29
	H173	C1K	58-66												
	H173	C2K	66-76	8.9	0.369				0.98	0.038	26				
	H173	C3k	76-81	9.0	0.313										
Belmont	H22	A11	0-13	6.8		100			4.3	0.381	11	28.5	17.2	0.94	0.32
528567 E	H22	A12	13-25	7.2		70			3.3	0.202	16	33.1	18.4	1.37	0.16
5248360 N	H22	A13g	25-48	7.7		50			1.26	0.095	13	27	22.7	1.8	0.09
	H22	A3g	51-61	8.4					0.52	0.035	15				
	H22	Ck	61-89	8.8					0.2	0.022	9	32.2	28.2	3.9	0.09
	H22	Rw	89-109	8.7											

Soil Profile Class Grid Reference	**Profile Number**	**Horizon**	**Sample Depth (cm)**	**Total Bases**	**CEC**	**BASE SAT (%)**	**ESP (%)**	**Ca/Mg Ratio**	**Gravel (of total) >2000 (um) (%)**	**Sand Coarse >200 (um) (%)**	**Sand Fine <200 (um) (%)**	**Silt (%)**	**Clay (%)**
Belmont	H173	A11	0-2			69	0.7	1.96	0	5	28	20	34
519902 E	H173	A12	2-10			75	1.1	1.70	0	6	31	18	36
5271375 N	H173	A13	10-18										
	H173	A14	18-29			86	2.4	1.33	5	6	26	10	60
	H173	A15	29-41			92	2.8	1.15	7	7	22	6	65
	H173	AC1	41-48										
	H173	AC2	48-58				3.4	1.02	12	10	21	5	63
	H173	C1K	58-66										
	H173	C2K	66-76										
	H173	C3k	76-81										
Belmont	H22	A11	0-13		58.66	80	1.6	1.66	1	7	34	15	40
528567 E	H22	A12	13-25		60.43	88	2.3	1.80	2	5	29	11	50
5248360 N	H22	A13g	25-48		55.49	93	3.2	1.19	0	9	25	11	57
	H22	A3g	51-61						1	11	22	13	49
	H22	Ck	61-89				6.10	1.14	0	23	22	23	30
	H22	Rw	89-109						18	34	21	16	19

Table 4 Cont

3.2.3 Brown Soils on Dolerite (Bd)

This group of soils, which although it occurs extensively in surrounding areas, is found only as small patches in this sheet. These patches may be in association with either the black soils *(Belmont SPC)* or the podzolic soils *(Eastfield SPC)* on dolerite. The soil is generally a stony brown loam to fine sandy loam with a brown or reddish-brown clay subsoil overlying dolerite at a shallow depth. *They are generally found in the drier areas of the State (480-635mm) and at elevations up to 520m. Calcium carbonate is frequently present in the subsoil or C horizon.*

Land Use

The natural vegetation is a savanna woodland.

Correlation

No work was undertaken within this unit due to it's very small extent within this map sheet.

3.3 Soils on Mudstone

3.3.1 Podzolic Soils on Mudstone (Pm)

Grey soils formed from mudstone are found particularly in the Forcett district, but also elsewhere throughout the sheet. Slopes in the mudstone hills vary from gentle to steep, and outcrops of parent rock occur occasionally. Many of the soils are shallow with angular fragments of rock throughout the profile. The surface horizon, generally only slightly darkened by organic matter, overlies a bleached A2 horizon. The texture is most commonly sandy loam but may vary from loamy sand to fine sandy or silty clay loam. These horizons occasionally rest directly on rock, but more frequently there is a subsoil of grey-brown or yellow-grey clay which is sometimes very thin.

Sandy profiles and profiles with bright coloured subsoils are associated with interbedded layers of sandstone or shale, *typical in the east of the map*.

Land Use

These mudstone soils inherit a low nutritional status from their parent rock and appear unattractive for development. The natural vegetation found on them is a scrubby type of sclerophyll forest with a sparse ground cover showing patches of gravelly soil.

Correlation

The soils formed on the Permian sediments within this map are variable. Loveday (1955c) identified shallow stony grey-brown podzolics as being the dominant soil of this unit. Available data and limited field work has shown that this soil is common in the drier western parts of the sheet where rainfall is less then 750mm. In the eastern part of the sheet rainfall is greater then 750mm and the mudstone is frequently interbedded with sandstone and shale. The soils in this part of the map sheet appear to be more leached, have a humic surface and thixotropic A2. Davies (1988), also found that the soils, climate, geology and vegetation varied from east to west across the Sorell area. In the landsystems map, Davies split the mudstone group along the 750mm rainfall isohyet. In order to try and provide more information to potential users, the original Pm map unit has been divided along the approximate line of this isohyet. The more western unit (Pm1) correlates most closely with that described by Loveday.

***Pm1** - The dominant soil within this unit has been identified and is called the **Forcett SPC**. This is the largest group of mudstone soils on the Sorell sheet. The podzolic soils formed on mudstone within this unit have a annual rainfall less then 750mm (Davies, 1988). On the crests and upper slopes these soils are generally acidic shallow, powdery Kurosols with fragments of angular mudstone throughout. They have a hard setting, weakly developed surface horizon over a hardsetting massive A2 horizon. This overlies a weakly developed mottled clay, which increase in depth further downslope.*

***Pm2** - The Pm2 group includes soils formed on mudstone, sandstone and shale with rainfall greater than 750mm. The largest area of this unit occurs on the western side of Ragged Tiers. No SPC is available for this unit. For more information about the soils within this region refer to Davies (1988).*

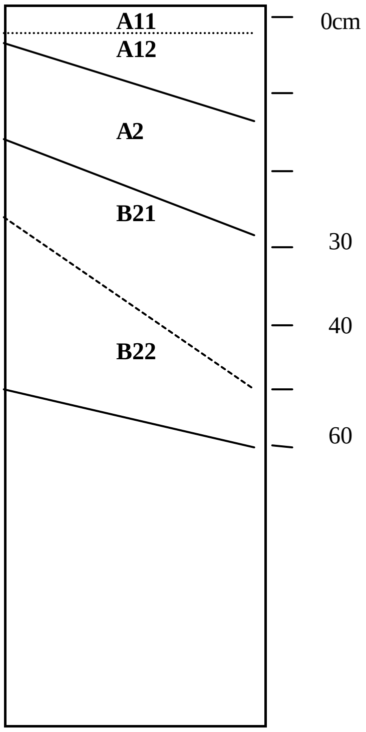
Forcett Soil Profile Class

Concept — **Shallow stony acidic soils, with a brown to grey weakly structured surface over a bleached, hardsetting subsurface over a weak to moderate structured clay subsoil.**

Aust. Soil Classification — Dystropic brown or grey kurosol
Great Soil Group — Grey brown podzolics or soloth
Principal Profile Form — Dy , Db
Mapping Units — Pm1, Pm2
Geology — Permian sandy mudstones with interbedded shales and sandstones

Landform — Coluvial slopes

Vegetation — Dry Sclerophyll forest, *E. salicifloria, E. risdoni, E. tasmanica, E. viminalis* & in moister *situations E. obliqua*
Surface Conditions — Hard setting and stony
Permeability — Slow to very slow
Drainage — Poor to imperfect



A11: Grey (10YR 2/2, 3/1, 4/2) moist; fine sandy loam; weak fine 2-5mm granular structure; very weak (dry) consistence; 10-20% angular mudstone gravels; pH 4.5 - 5.5; diffuse boundary to

A12: Grey (10YR 3/1, 2/2, 4/2) moist; fine sandy loam; weak fine 2-5mm granular structure; very weak (dry) consistence; 10-50% angular mudstone gravels; 0.05 dSm-1; pH 4.5 - 5.5; clear boundary change to

A2: May be bleached; grey (10YR 6/1, 6/3, 4/2) moist; fine sandy loam; massive structure; firm (dry) consistence; 20-50% angular mudstones gravels; 0.05 dSm-1; pH 4.5 - 5.5; abrupt boundary to

B21: Mottled; brown (10YR 5/1,5/2, 2/2, 4/3) moist; yellowish brown (10YR 5/8, 5/6, 6/3) mottles; fine sandy medium clay; massive to weak 20-50mm subangular blocky; firm (moist) consistence; 20-90% angular mudstone gravels; dispersive; 0.07 dSm-1; pH 4.5 - 5.5; diffuse boundary to

B22: Mottled: brown (10YR 2/2, 5/3, 4/2, 5/8, 5/1) moist; yellowish brown (10YR 5/8, 5/6, 6/3, 2.5Y 5/3) mottles; fine sandy medium to heavy clay; massive to moderate 20-50mm subangular blocky; firm (moist) consistence; 20-90% coarse mudstone fragments; dispersive; 0.08 dSm-1; pH 5.0 - 5.5

Morphological Sites for Sorell: CSIRO H154, H221, H199, H225; SOILCO 33
Analysed Sites for Sorell: CSIRO H154, H199, H221, H225
Related soil names: Podzolics on Mudstone
Previously described by: Loveday (1957), Spanswick (1999), Spanswick & Kidd (2000a, 2000b & 2000c)

3.4 Soils on Sandstone

3.4.1 Podzol and Podzolic Soils on Sandstone (Pss)

Areas of sandstone occur scatted throughout this sheet, often forming basins of subdued relief surrounded by more rugged dolerite hills. Drainage from the basins is restricted so that swampy areas and ponds are formed amongst the low sandstone hills. The dominant soils of this group are podzols.

The important profile characteristics and the relationship to drainage status of the site are essentially as for the cover sand group, see section 3.5.1. However, one difference is that in these soils there is a texture increase from the sand of the surface to a clayey sand, sandy clay or clay in the subsoil.

In the western part of the area, with rainfall near *510mm* the soils developed on sandstone do not have a black organic pan in the subsoil. Rather there is a weakly mottled yellow sandy clay subsoil, while the sub-surface is not so bleached as in the true podzols.

Land Use

Although these sandstone soils have not been used for agriculture to any extent but carry sclerophyll forest and heath vegetation, they offer possibilities for development.

Correlation

This map unit occurs extensively within the Reconnaissance Series. The soils within this unit are variable due to the complex parent material and variations in rainfall. This unit is comprised of Triassic sandstones and mudstones of the Upper Parmeener Super-Group. The Triassic sediments have formed as low rolling hills often capped by dolerite, and subdued basins.

Loveday identified podzols as being the dominant soil within the Pss map unit. However defining this soil has been extremely difficult as the range of clay content described within the B horizon covers a broad range. The coarse textured podzols (low clay content) within this map sheet are generally associated with siliceous bedrock (eg sandstone) and windblown sands. They tend to have reasonably uniform textures throughout the profile. The fine textured podzols (high clay content) were found on siliceous and argillaceous bedrock (eg mudstone). The fine textured podzols generally have an accumulation of coarse sand on the surface grading into fine heavy textures in the B horizon, ped faces in the B horizon are often covered with coarse sand which has moved down the profile by water or gravity. The development of a Bh or Bhs horizon (organic or sesquioxide accumulation layer below the A2) and its degree of cementation also varies considerably across the map sheet. However in general the podzols in the east of the sheet, where rainfall is much higher, tend to be more leached and have better developed Bh & Bhs horizons.

Podzolic soils were also observed within this unit. Like the podzols, fine and coarse textured podzolics were observed. The podzolics were generally found in upper slope or crest positions, however podzolics were found around Copping in lower areas associated with interbedding of shale and mudstone.

No SPC is available for either of this unit due to insufficient data.

3.5 Soils on Cover-Sands

3.5.1 Podzols on Cover-sands (Pcs)

At a number of places along the coast, particularly where the aspect is south westerly, wind-blown sand accumulations have occurred both as dunes adjacent to the shore and as a sand sheet covering slopes of the coastal hills. Outcrops of the underlying rocks occur on these slopes, and towards the margins the sand sheet becomes very thin.

There are two main groups of soils *which reflect differing* drainage conditions. In the freely draining sites podzols have developed. The surface is a dark grey sand over a bleached sub-surface. The subsoil may consist of light yellow sand but frequently below *60cm* there is a soft or weakly cemented black sand with a yellow-brown underlayer passing to a light yellow sand below. In poorly drained swales, ground water podzols may be found. Surface and sub-surface features are similar to those above but in the subsoil a hardpan *8-15cm* thick, black on top with yellow-brown under-layers has developed. The horizons both above and below the hardpan may be saturated with water depending on the season.

Included with these soils on the map are small areas of sands adjacent to the coast where profile development is restricted to slight accumulation of organic matter in the surface and incipient bleaching of the sub-surface. Where the sand sheet is thin various clay or sandy clay subsoils formed from the underlying rocks are to be found.

Land Use

These sandy areas have open sclerophyll forest with heath vegetation. Very little of the land has been cleared although with suitable fertilising it would appear capable of development.

Correlation

Due to limited information and subsequent widespread urban development in these areas since the original survey, no SPC has been defined for this unit.

3.6 Soils of Recent Sands

3.6.1 Soils of Recent Sands and Shell Beds (Rs)

There are several small areas and two extensive areas of recent sand, Seven Mile Beach and Marion Beach. Adjacent to the shoreline, sand with many shell fragments is actively accumulating, but inland where the sand is stabilised by vegetation it becomes less calcareous and *more siliceous with* weak profile differentiation. The surface horizon is darkened by organic matter accumulation and the sub-surface shows incipient bleaching.

Land Use

The areas of stabilised sand are suited to the growth of pines, the Seven Mile Beach plantation bearing witness to this.

Correlation

No work was undertaken within this unit due to its limited extent and restricted agricultural use. This unit also occupies small areas of the east coast on the Buckland soil map.

3.7 Undifferentiated Alluvial Soils

3.7.1 Soils of Alluvial Deposits (A)

This group includes a wide variety of soils formed on present day flood plains, various terrace remnants, and alluvial fan formations around the coastline. The alluvial deposits vary from sands to clays and gravels, many being stratified. In some places there is an annual deposition of silt or sand so that the soil is being built up. Many of the soils are dark coloured, of clay texture and with mottling in the subsoil. Some have small amounts of concretionary lime in the subsoil. Others have a grey-brown sandy loam surface over a bleached sub-surface and a mottled clay sub-surface. In one area this subsoil showed strong columnar structure. Several small patches on Forestier Peninsula included with this group have a black peaty sand surface over a bleached sand which in turn overlies a black hardpan.

Land Use

These soils are important agriculturally. There are but few areas not already developed.

Correlation

No work was undertaken in this unit due to the complexity of the soils. More Information about the alluvial soils within this map sheet may be found in Davies (1988) Landsystems map of southern Tasmania

3.8 Lateritic soils

3.8.1 Lateritic Soils (L)

One small patch of lateritic soils occurs immediately south of the Denison Canal at Dunalley. The canal cut reveals the deep mottled and pallid horizons of this ancient soil. North of the canal where subsequent dissection has cut away the upper horizons soils are forming on the exposed clay or on more recent alluvium. The surface soil of the remnant south of the canal is a dark grey loamy sand over a bleached sub-surface with moderate amounts of ferruginous gravel. The subsoil is a yellow-brown friable clay with red flecks and occasional ferruginous concretions. The deep subsoil, as seen in the canal, is a light grey and red mottled clay. Some of the red mottles apparently harden on exposure to air.

Correlation

The extent of this soil was too small to spend time defining the dominant soil.

REFERENCES

Bond R.D. and Tucker B.M. (1954), Chemistry and Industry, 40, 1236. *Publisher unknown.*

Davies J. (1988), Land Systems Surveys of Tasmania Region 6: South, East and Midlands, Department of Agriculture, Tasmania.

Doyle R.B. (1993), Soils of the South Esk Sheet, Tasmania (southern half), Department of Primary Industries, Water and Environment Tasmania Australia.

Graley A.M. (1961), The Laboratory Examination of Soils of Sheet 47 - Longford, Tasmania CSIRO Division of Soils, Divisional Report 2/61, Adelaide.

Gulline A. B. (1982), Tasmanian Department of Mines Geological Atlas 1:50 000 series Sorell.

Gunn R.H., Beatie J.A., Reid R.E. and van de Graaff R.H.M. (1998), Australian Soil and Land Survey Handbook - Guidelines for Conducting Surveys. Inkata Press, Australia.

Haldane A.D. (1956), *Journal of Soil Science*. Vol 82: 483-489.

Hutton J.T. (1954), A method for the determination of calcium plus magnesium by titration with ethylenediamine tetraacetic acid. Divisional report 9/54, part C, CSIRO Division of Soils, Adelaide.

Hutton J.T. (1955), A method of particle size analysis. Divisional report 11/55, CSIRO Division of Soils, Adelaide.

Isbell, R.F. (1996), The Australian Soil Classification. CSIRO Publishing, Australia.

Loveday J (1954) Soil map of Bream Creek Area, Tasmania. Unpublished CSIRO, Division of soils Adelaide

Loveday J (1954) Soil map Wattle-Hill Area, Tasmania. Unpublished CSIRO, Division of Soils Adelaide.

Loveday J (1957), Soils of the Sorell-Carlton-Copping area, south-east Tasmania, with special reference to the soils formed on basalt. CSIRO Division of Soils, Adelaide. Publication No. 8

Marshal T.J. (1956), A plummet balance for measuring the size distribution of soil particles. Australian Journal of Applied Science. 7: 142-147.

McDonald R.C, Isbell R.F., Speight J.G., Walker J., & Hopkins M.S. (1998), Australian Soil and Land Survey Field Handbook, Second Edition, Goanna Print Canberra.

Murphy J. and Riley J.P (1962), A modified single solution method for the determination of phosphate in natural water. An*al. Chim. Acta* **27**, 31-6.

Noble K. E. (1992a), Land Capability Survey of Tasmania, Land Capability Handbook. Department of Primary Industry, Tasmania.

Piper C.S. (1942), Examination of soil and distribution of the inorganic constituents of plants. Soil and Plant Analysis. University of Adelaide.

Raupach M. (1956), *Australian Journal of Agriculture Research.* Vol 5: 716-729.

Rayment G. E and Higginson F.R., (1992), Australian Soil and Land Survey Handbook – Australian Laboratory Handbook of Soil and Water Chemical Methods. Inkata Press, Australia.

Spanswick S.B. and Zund P. (1999a), Revised Longford Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania.

Spanswick S.B. and Zund P. (1999b), Revised Quamby Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania.

Spanswick S.B. and Kidd D.B. (In prep), Revised Buckland Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania. In press.

Spanswick S.B. and Kidd D.B. (In prep), Revised Hobart Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania. In press.

Spanswick S.B. and Kidd D.B. (In prep), Revised Brighton Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania. In press.

Stace H.C. and Hutton J.T (1958), Flame Excitation methods of Spectrochemical Analysis. CSIRO Melbourne.

Stace H.C., Hubble G.D., Brewer R., Northcote K.H., Sleeman J.R., Mulcay M.J., and Hallsworth E.G. (1968), A Handbook of Australian Soils, Rellim Technical Publications, South Australia.

Stephens C.G., Baldwin J.G. and Hosking J.S (1942), Soils of the parishes of Longford, Cressy, and Lawrence, County of Westmoorland, Tasmania. CSIRO Bull. No. 150.

Taylor R.M. and Pickering J.G. (1963), Clay mineralogy of soils of the Launceston Tertiary Basin, Tasmania. CSIRO Divisional report 9/63.

Tiller K.G. (1962), Weathering and Soil Formation on Dolerite in Tasmania with Particular Reference to Several Trace Elements. *Aust. J. Soil Res., Vol 1, No. 1. 74-90p.*

APPENDIX 1

List of Key Soil Horizon Designations Used in SPC's

Horizons (some of which may be subdivided eg, A11 and A12)

A1 Topsoil, zone of maximum biological activity, usually dark in colour.

A2 Grey, generally sandy, sometimes bleached, eluvial horizon (less clay, organic matter and sesquioxides than horizons above and below).

A3 Transitional horizon between A and B horizon and more similar to A than B horizon.

B1 Transitional horizon between A and B horizon and more similar to B than A horizon.

B2 Main subsoil horizon, either:-

1) clay, humus or sesquioxide accumulations or

2) maximum pedological development such as structure or colour.

B3 Transitional horizon between B2 and C horizon and having significant amount of clay to still be classed as part of the solum.

BC As above.

C Weathered parent material and partially weathered rock from which the soil has formed.

D Buried horizon which is unlike the pedological organisation of the overlying horizons.

R Bedrock.

P1 Primarily undecomposed organic matter (peat).

P2 Primarily decomposed organic matter (peat).

Horizon Suffixes Used

e conspicuously bleached horizon, for example A2e.

g Gleyed horizon caused by very poor drainage.

h accumulation of humified, well decomposed organic matter.

j sporadically bleached horizon, for example, A2j.

k accumulation of carbonate.

t accumulation of silicate clay .

w weakly developed B horizon, ie, colour or structured B horizon, little or no illuviation.

For full horizon definitions refer to MacDonald *et al.* (1990). This figure has been modified from Doyle (1993), p 118.

APPENDIX 2

Analytical Methods for CSIRO sites

The following analytical methodology, taken from Graley (1961), is assumed to be similar for the sites analysed by CSIRO Division of Soils on this map.

The methods of analyses used were essentially those of Piper (1947) but with the following modifications:

pH was determined using a glass electrode and the system described by Raupach (1954).

Phosphorus is reported as "total" P dissolved by four hours boiling with concentrated hydrochloric acid. It was determined by a colorimetric method using butanol to extract the ammonium phosphomolybdate prior to its reduction with stannous chloride to the blue complex.

"Free" ferric oxide was determined using a modification by Haldane (1956) of Jeffries' method.

Particle size distribution was determined on a number of samples by the International pipette method and on others by the rapid plummet balance method (Marshall, 1956) after dispersion of the soil using "calgon" (Hutton, 1955). Use of the pipette method is indicated in the tabulated data by quoting the results of the silt and clay fractions to one decimal place and of the plummet method to the nearest whole number. Coarse and fine sands are quoted to the nearest whole number for both methods.

Exchangeable metal cations were extracted by leaching with normal ammonium chloride and the leachate examined by titration with E.D.T.A for calcium and magnesium (Bond and Tucker, 1954 and Hutton, 1954) and by the "Eel" flame photometer for potassium and sodium (stace and Hutton, 1958).

Exchangeable hydrogen has been determined by both the paranitro phenol (to pH 7.0) and meta-nitrophenol (to pH 8.4) methods of Piper (1942) but the total exchangeable cations recorded are the sum of the metal ions and exchangeable hydrogen to pH 8.4.

Values are reported for fractionation of the coarse and fine sands from certain samples. These were determined by sieving through five inch sieves with hand shaking for twenty minutes.

Analytical methods for DPIWE sites

Soil pH and electrical conductivity were measured in a 1:5 soil:water ratio.

Clay mineralogy was determined by the Tasmanian Department of Mineral Resources using X-ray diffraction.

Exchangeable Aluminium and Acidity was measured using method 15G1 described by Rayment and Higginson (1992).

Organic Carbon was measured using the Wakley and Black method described in Rayment and Higginson (1992).

Available phosphorus was measured using method 9B2 described by Rayment and Higginson (1992) based on Murphy and Riley (1962).

Air-dry moisture content has been expressed as a percentage based on method 2A1 described by Rayment and Higginson (1992).

Total nitrogen was measured using an auto analyser following method 7A2 in Rayment and Higginson (1992).

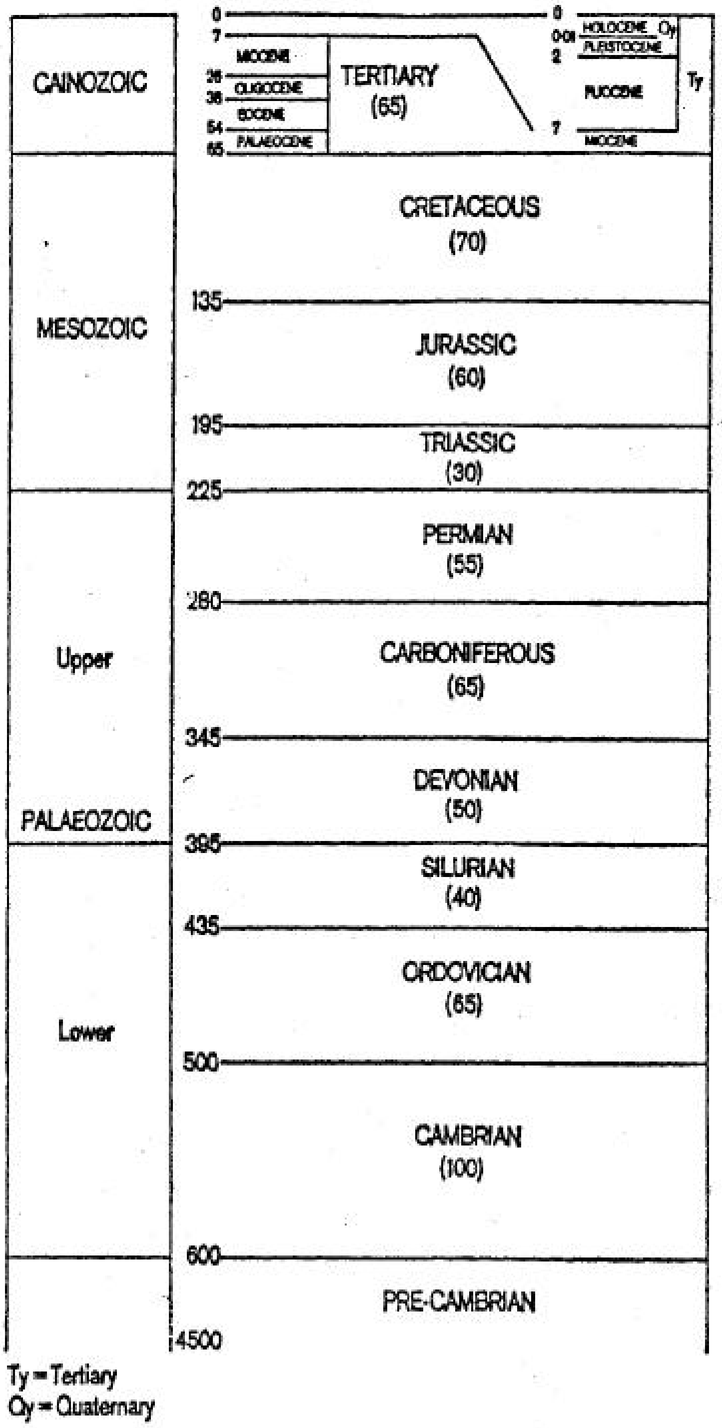
Copper, Zinc, Manganese and Iron was measured using method 12A1 described in Rayment and Higginson (1992).

Calcium, Magnesium, Sodium and Potassium was measured by ammonium chloride at pH 7.0 using method 15B3 in Rayment and Higginson (1992).

APPENDIX 3

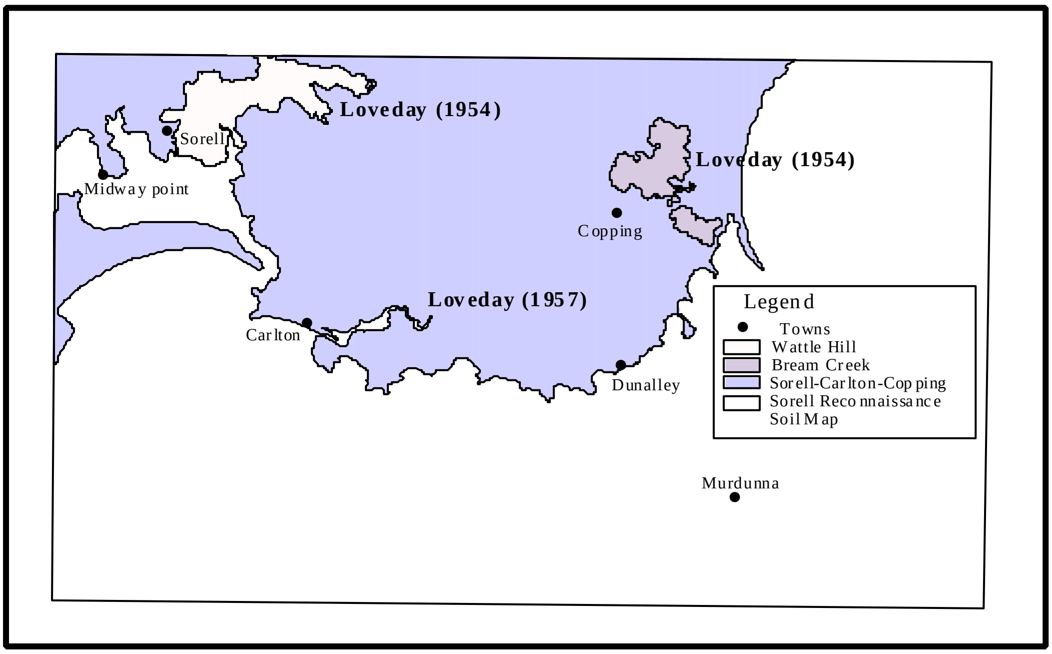
Geological Timeline

Taken from Brooks J.R.V., and Whitten D.G.A., (1972) Dictionary of Geology . Published by Penguin, England.



APPENDIX 4

Index Map Showing Detailed Surveys occurring on the Sorell Reconnaissance Map



APPENDIX 5

List of Reports in the Reconnaissance 1:100 000 Soil Map Series

Cowie, J.D. (1959), Reconnaissance soil map of Tasmania. Sheet 68, **Oatlands**. Div. Rep. Div Soils CSIRO Aust. 4/59**;** Scale 1:63 360

Doyle, R.B. (1993), Soils of the **South Esk** Sheet Tasmania (southern half) Reconnaissance Soil Map. DPIF Soil Survey Series of Tasmania No 1.
Scale 1:100 000

Dimmock, G.M. (1956), Reconnaissance soil map of Tasmania **Flinders Island**. Div. Rep. Div. Soils CSIRO Aust. 8/56**;** Scale 1: 63 360

Dimmock, G.M. (1957), Reconnaissance soil map of Tasmania. Sheet 75, **Brighton**. Div. Rep. Div. Soils CSIRO Aust. 2/57**;** Scale 1: 63 360

Dimmock, G.M. (1960), Soil reconnaissance of the area between the **Tomahawk and Ringarooma Rivers**, N.E Tasmania. Tech memo. Div. Soils CSIRO Aust. 7/60**;** Scale 1:63 360

Dimmock, G.M. (1961), Reconnaissance soil map of Tasmania. Sheet 74, **Ellendale**. Div. Rep. Div. Soils CSIRO Aust. 5/61**;** Scale 1:63 360

Dimmock, G.M. (1964), **Beaconsfield** Soil Survey. CSIRO (unpublished)**;**
Scale 1: 100 000

Hubble, G.D. (1951), Reconnaissance survey of the **Coastal Heath Country, N.W** Tasmania. Div. Rep. Div. Soils CSIRO Aust. 10/51 **;** Scale 1:126 720

Leamy, M.L. (1961), Reconnaissance soil map of Tasmania, Sheet 61. **Interlaken**. Div. Rep. Div. Soils CSIRO Aust. 6/61**;** Scale 1:63 360

Loveday, J. and Dimmock, G.M. (1958), Reconnaissance soil map of Tasmania. Sheet 76, **Buckland**. Div. Rep. Div. Soils CSIRO Aust. 13/57**;** Scale 1: 63 360

Loveday, J. (1955), Reconnaissance soil map of Tasmania, sheets 22 and 28 - **Table Cape and Burnie**. Div. Rep. Div. Soils CSIRO Aust. 14/55**;** Scale 1:126 720

Loveday, J. (1955), Reconnaissance soil map of Tasmania. Sheet 83, **Sorell**. Div rep Div Soils CSIRO Aust 10/55**;** Scale 1:63 360

Loveday, J.. (1955), Reconnaissance soil map of Tasmania. Sheet 82, **Hobar**t. Div rep Soils CSIRO Aust. 13/55**;** Scale 1:63 360

Nicolls, K.D. (1955), Soils, geomorphology and climate of an area between the **Lagoon and Arthur Rivers**, West Coast of Tasmania Div. Rep. Div. Soils CSIRO Aust. 7/55**;** Scale 1:126 720

Nicolls, K.D. (1957), Reconnaissance of the soils around **Georgetown**, Tasmania. Tech. Memo Div Soils CSIRO Aust 3/57**;** Scale 1: 126 720

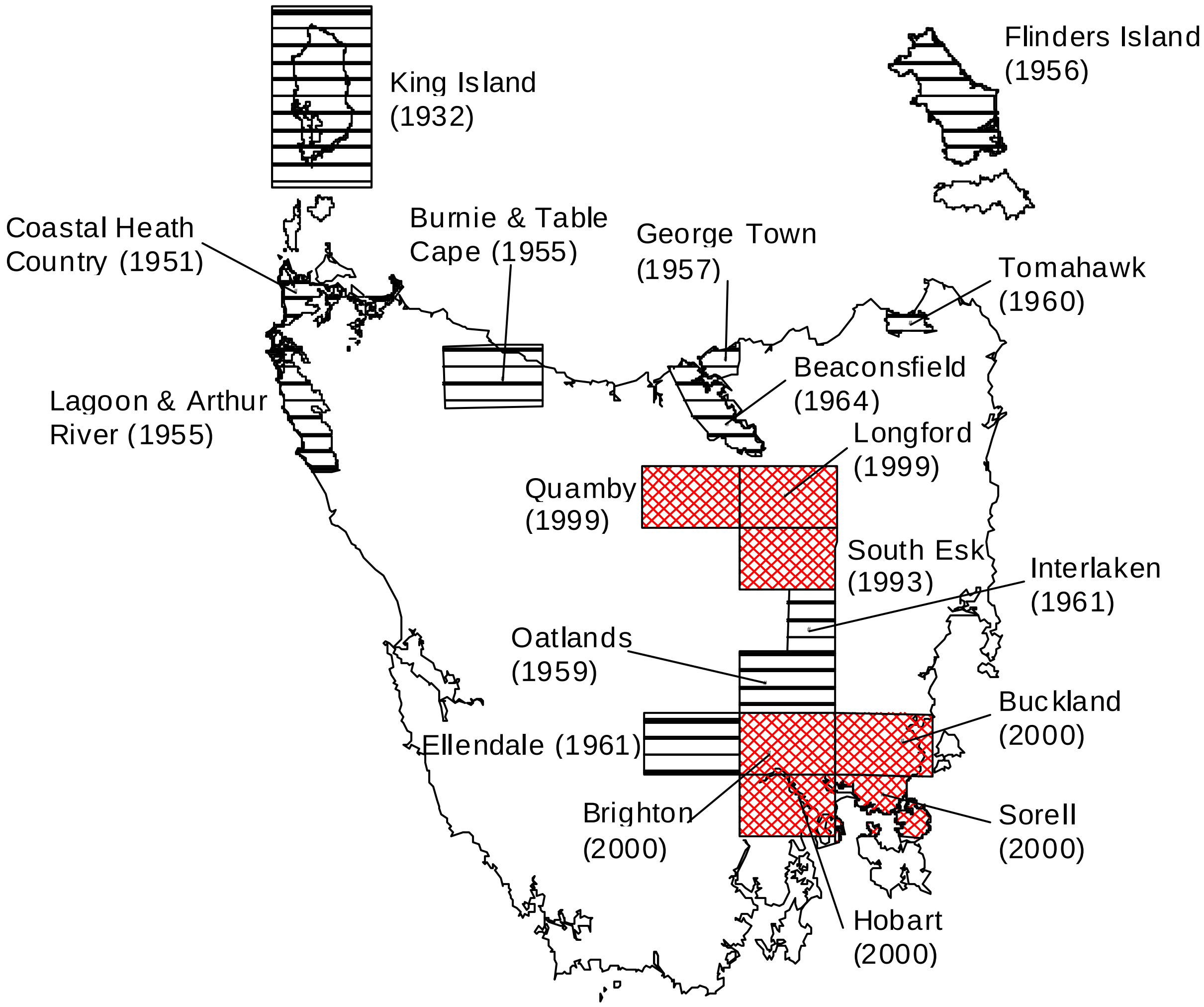
Spanswick S.B. and Zund P. (1999a), Revised **Longford** Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania.
Scale 1:100 000.

Spanswick S.B. and Zund P. (1999b), Revised **Quamby** Reconnaissance Soil Map of Tasmania. Department of Primary Industry Water and Environment, Tasmania.
Scale 1:100 000.

Stephens, C.G. and Hosking, J.S. (1932), A soil survey of **King Island**. Bull. No 70 CSIRO Aust**;** Scale 1:126 720.

APPENDIX 6

Index Map of the 1:100 000 Reconnaissance Soil Surveys of Tasmania



Correlated maps shown by cross-hatching